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ABSTRACT

This document was originally produced for use with thirteen- to fifteen-year-old pupils of low mathematical attainment. The material has not been extensively tested, and is best regarded as a collection of ideas for development. Reproduction of any of this material for use by teachers with their own pupils is encouraged. The sheets are arranged so that they may be cut up and stapled to form 16 small "topic booklets." In addition, there are eight sheets to be cut up into 16 sections each for use as cards in a calculator game. The three main approaches of the document are: (1) to give pupils success, via the calculator, and encourage more positive attitudes towards mathematics; (2) to allow students to view the order and pattern of certain mathematical concepts that more successful students are already able to perceive; and (3) to lead to confidence and proficiency in basic mathematical processes without the calculator. (MP)

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BAC pac

Basic Arithmetic with a Calculator

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SE 035 604

F.R. Watson
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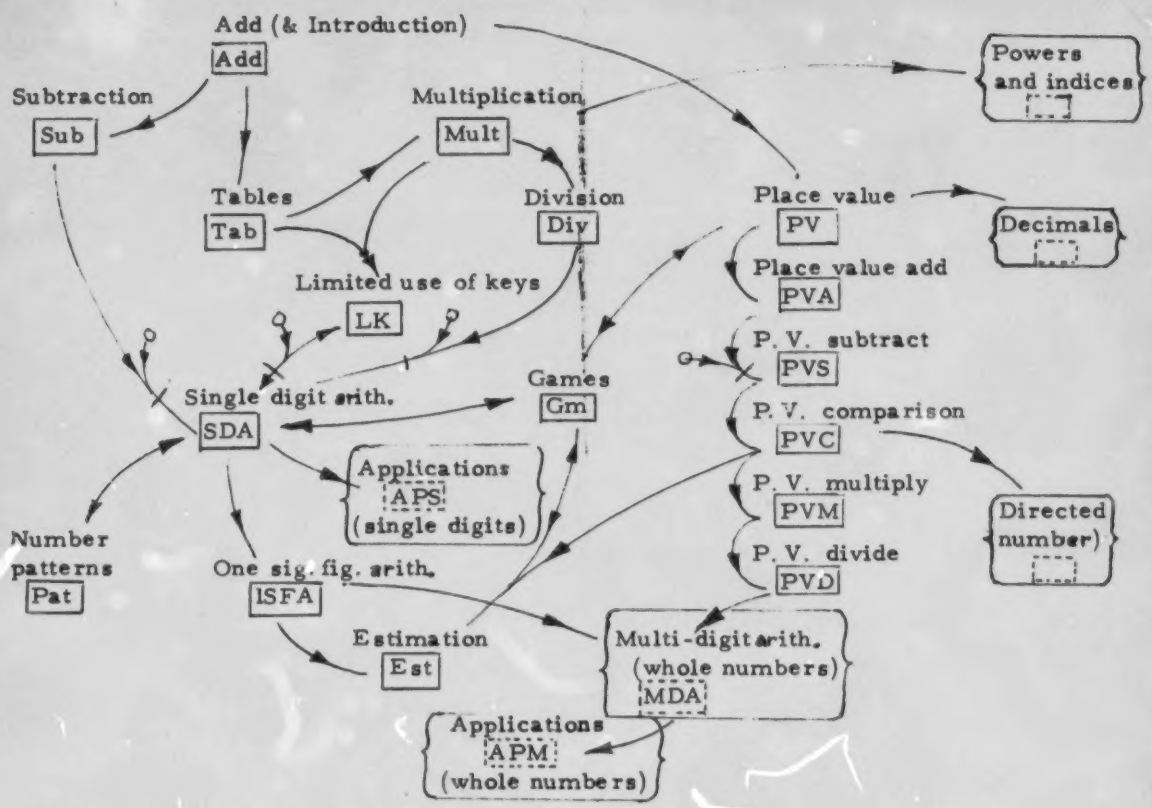
'Map' showing inter-relation of topic booklets



Interpretation of arrows and topics :-

A → B A can be followed by B

A ⊣ B B needs A & others.

{ } No booklet provided

Acknowledgements

I am grateful to Mrs. B. Wiggins for typing the material, to Miss H. Adams for the graphic work, to Mrs. C. Lea for printing, and to the children and teachers at Blurton High School, Stoke-on-Trent, for allowing me to try out these ideas.

P.R. Watson

Instructions for Use

1. Unstaple
2. Extract 4 sets each of 4 booklets
   (pp 5-16, 17-24, 25-30, 31-44)
3. Cut and staple to form 16 booklets (A6 size); pages are already in order

Note. Gm9, 10 may be included in PVS and Est respectively

Gm1-8 may be left as separate sheets.

4. Extract game sheets (pp 45-60) and cut each into 16 'cards'.

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CONTENTS OF TOPIC BOOKLETS

Addition (Add)	A	1, 2	"Introduction". Switch on, [3], off / 3+2=5.
	B	1	Counting up to 20.
	C	1, 2	3+4=7 etc. / 11+3=14 etc.
	D	1, 2	Counting in even nos. / odd nos.
	E	t1	2+5+2, 32+4
		t2	Test on addition 37+73, 1+2+3+4+5.
Subtraction (Sub)	A	1, 2	Counting down from 10. / 8-3.
	B	1	Reversibility (+), (−)
	C	1	Use of (B) in calculations, 93+5-4.
	D	t1	9-3, 113+6-3.
Tables Practice (Tab)	A	1, 2	7x1=7, etc. / 8 and 4.
	B	1, 2	4+4+4..... / 3 and 6.
	C	1, 2	3x5=, 7=,...
	D	1, 2	6=6=6.... (T) . / 9.
	E	t1, t2	Test on process A-D/Table test.
	E	t3	Using (×)
	F	1	5x4=20.
Limited Keys (LK)	A	1, 2, 3	Using only 1, 2 / 2, 1 / 1, 2 (+)
	B	1	2, 3 & (×)
	C	1, 2	1, 2 mixed (+) & (×) Allow 22 / disallow.
Estimates (Est)	A	1, 2	Numbers nearly equal.
	B	1	Practice 50x10, 60x30.
	C	1	Choosing best sub-estimates.
	D	1, 2	Choosing best answers.
	E	1	Estimate too big or too small.
Multiplication (Mult)	Mult	1.	2+2+2+2=2x4.
		2.	5x7, 6x6
		3.	4x3=3x4, 11x34=34x11 (Calc)
		4.	2x3x4=2x4x3
		5.	2x2x2...
		6.	Overflow {L}
Division (Div)	Div	1.	Whole nos. 1, 5.
		2.	8÷3=2.6666666
		3.	42÷6. 33÷2. ← whole no.
		4.	Rule for evens (last digit)
		5.	Rule for ÷ by 5 (last digit)
		t1	Test 24÷4 etc.
Single figit arithmetic (SDA)	SDA	1.	Which are even? ≤ 30.
		2, 3	Which are odd? ≤ 30.
		4.	3+4, 4+3. 5+3+7, 7+5+3.
		5.	5+6+7, 6x3.
		6.	7+8+9+10, 8+9.
		7.	Reversible (+), (−), (×), (÷)
		t1	Mixed (+)(−)(×)(÷)
		t2	Make up own
		t3	Arrows · [3] −5→ (8)
		t4	Mystery tour.
One sig. fig. arithmetic (1SFA)	1SFA	t1	Names, 10x10 etc.
		2	3+5, 30+50
		3	5-3, 50-30
		4	10x100, 230+10
		5	30x50
		6	600÷2, ÷20
		t7, 8, 9	Mixed

Pattern (Pat)		1	Odds
		2	2n, 3n, 5n
		3	1, 4, 7 / 4, 8, 12 / 5, 9, 13
		4	2, 5, 8 / 1, 3, 6 / 1, 4, 9, 16
		5	Sq. nos.
		6	Δ nos.
		7	10x20, 15^2
		8	4n+3, 3n+2, 99, 97,...39, 36,...
		9	n^2-4
Place Value (PV)	E	1	10+5
		2	10+10+10, 19+1
		3	80+10, 10x10
		4	40+30, 21+5, 29+1
		5	100+100, 405+3, 219+1
	F	1	137+10, 454+30
		2	371+14
	G	1	x10, ÷ 10(shift)
		2	mixed. 77x10, 3000÷1000
(PVA) addition		1	374+7 carry
		2	237+20 carry
		3	practice and double carry
		t4	hm add
(PVS) subtraction		1	47-5
		2	47-20
		3	47-22
		4	counting on 37→40→60→63
		5	33-7
		6	43-27
		7	374-7
			(Full 3 digit subtraction is MDA)
(PVC) comparison		1	8>5
		2	37<45
		3	Find biggest of 4
		4	Notation (>, <)
(PVM) short multiplication		1	80x3
		2	217x5
		t3	84x3, Estimate
(PVD) short division		1	80÷2
		2	1263÷3
		3	5)85 9)477
		t4	"20 to learn" e.g. $\frac{60}{3}$ Test on these
Games (Gm)	Gm	1	"unarmed combat".
		2	Given 2n+3, find n
		3, 4	"formula machine"
		5	376→895 by (+) or (−)
		6	42 (T) & (−)(÷) 6 ; tell operation and reverse
		7	7→45 by (×), (+), (−) single digits
		8	Build up 30 from 1, ...9, each no. once.
		9	Estimate and check
		10	3721→3921

The sign) means teacher should check work at end of task.

Teacher's Notes

This material was produced for use with 13-15 year old pupils of low mathematical attainment. It has subsequently been tried out, to a limited extent, with two such groups - but because it has not been extensively tested, it is best regarded as a collection of ideas for development.

It constitutes a flexible framework which could be expanded with additional material in areas where this is needed - indeed, it is likely to be of most use where teachers adapt it to their own circumstances; for some pupils many sheets may contain too much material. It may provide, at the very least, a start, and some ideas for modification.

'XEROX' or other reproduction of any of the material for use by teachers with their own pupils is encouraged.

Some material is calculator-dependent and will probably need to be rewritten; such sheets are indicated ✝ (See Add A1, Tab C1, C2, D1, D2, Et 1,2, Mult 6, PVC 1). The first of these is an introduction to the use of the calculator - which would be unnecessary if the children were already used to using their own calculators.

The sheets are arranged so that they may be cut up and stapled to form 16 small "topic" booklets, each of A6 size (i.e. $\frac{1}{4}$ A4). Coloured cover-sheets have been inserted at appropriate points, on which staple positions are indicated by ‡. Some of the sheets, containing games (Gm), are not intended to form a booklet, as they are more likely to be used singly. (These follow the sections PVS and Est). In addition, there are 8 A4 sheets intended to be cut up, each forming 16 "cards", for use in the game 'Unarmed Combat' (Gm1). On each card is a simple numerical expression; several of these represent the same number so that the cards may also be used to play "snap" (as a means of practising mental calculation; if necessary, a silent version may be insisted upon!) They are colour-coded in sets - teachers may wish to add other sets, of different degrees of difficulty.

Interrelations between topics are shown in the "map" (inside front cover); possible orders of work within each topic are evident from the specimen "progress chart" (inside back cover) and from the contents list (p 1). The numbering of task sheets is not completely consistent, but where sheets are labelled A1, A2, these are of the same type, and B1, C1 are of different type. Additional sheets A3, A4 etc. for further practice may be added as desired.

The aims of this approach were threefold:-

i) to give pupils some measure of success, via the calculator, in the hope of creating a more positive attitude to 'maths'

ii) to allow them, undistracted by the difficulty of computation or their lack of accuracy, to glimpse the order and pattern which some of their more successful schoolmates are able to perceive

iii) to give confidence and proficiency in basic mathematical processes without the calculator.

The second aim underlies some of the work on Pattern, on Place Value, Divisibility, etc. and the third is the reason for the oft repeated injunction "Think first, then CHECK" (i.e. check with the calculator), and for the 'practice tests' which are included from time to time. (When the material was being used, 'tables tests' and number games* were also interspersed. The slogan was "Aim to be independent of the calculator" - at least for single digit arithmetic). Some symbols and abbreviations were used:-

PCFD "place the calculator flat on the desk"
SWOWYF "switch off when you've finished"
and (intended as a smiling pupil with upraised hand)
"tell your teacher when you've finished this sheet".
● Read this ▶ Do this

Instructions not to write on the booklets, not to write answers unless they are asked for (and then to note the sheet number against written work), and to mark-off completed sheets on the "progress chart" (inside back cover) were also given to the pupils - though not invariably carried out! (For the latter a useful code is: Ø done once, ⊗ done again, ● completed - for some topics, such as tables practice, repeated use of the booklets may be desirable).

Only very simple arithmetic is covered, and long multiplication and division are omitted. (Some may argue that these pencil and paper skills are no longer essential if calculators are so widely available - however, similar tasks could be composed, or located in standard text books, if it is desired to cover these topics).

Perhaps a more significant omission is that of decimals - the booklet on Place Value could be extended to illustrate the ideas of decimals (e.g. by 123 ÷ 10, 12.3 ÷ 10 etc., see PVG1, 2). This could be augmented by paralleling the tasks of earlier booklets (PVA, PVS, etc.) using decimals. Other possible developments would include work on applications (booklets were projected on single-digit and multi-digit applications, (APS and APM), but are not included here), and, for the more proficient, illustration (or discovery) of the laws of indices could stem from the section on Multiplication.

*Example. Players choose alternately from the numbers $\{1, 2, \ldots 8, 9\}$ aiming to obtain in their collection a subset of 3 digits which sum to 15. No digit may be chosen twice.

Add

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Pat

8

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PV

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1SFA

9

▶ Place the calculator flat on the desk

Find the switch for ON and OFF, and SWITCH ON

The calculator shows {0.} This means 0 ("nought")

(Don't worry about the dot {.})

▶ Now press the key [3]

The calculator shows {3.} This means 3

(The dot {.} is called a decimal point; ignore it for now)

▶ Press the key (C CE)

The calculator shows {0.} again

▶ SWITCH OFF to save the battery.

GO TO THE NEXT PAGE

● Here is a pattern.

1, 3, 5, 7, 9, 11, ... These are the ODD numbers .

This is how we get it:

Start with 1, then add 2, add 2 again, ... keep on adding 2.

Like this

1 —add 2→ 3 —add 2→ 5 —add 2→ 7 —add 2→ 9.....

▶ Try this on your calculator.

[1] ⊕ [2] ⊕ [2] ⊕ [2] ⊕ [2] .....

GO TO THE NEXT PAGE

▶ Do 10+5= This is 5 units.

{15} means 'ten' and 5 'units'.

This is 'ten' without any units

{14} means 'ten' and four 'units'.

11+3=

▶ Add 3 more units

{11} means 'ten' and one 'unit'.

▶ Now do 10+1=

{10} means 'ten' and no 'units'.

9+1=

.... This means "continue the pattern"

4+1=

3+1=

2+1=

CHECK with the calculator.

▶ Work these out.

PVE1

● Here are some numbers.

1000 80 8000 800 10000

▶ First copy them out.

● These are their names BUT IN THE WRONG ORDER

▶ Write the names under the correct number.

(eight hundred), (eighty), (ten thousand) (eight thousand), (one thousand)

▶ Do these without your calculator.

WRITE DOWN the answers. Then CHECK.

1000+1000=	100+100=	10x10=
90+10=	800+12=	100x10=
99+1=	30+10=	1000x10=

▶ Ask your teacher to come and see your work.

SOWTF

▶ Place the calculator flat on the desk.

▶ SWITCH ON

▶ Press these keys, in order [3] [+] [2] [=]

The answer (5.) will appear in the display

You have worked out 3+2=5

▶ NOW SWITCH OFF

Always switch off when you finish so you don't waste the battery.

GO TO THE NEXT PAGE

What are the next three numbers in these patterns?

▶ WRITE DOWN your answers.

(A) 2, 4, 6, 8, 10, ...

(B) 3, 6, 9, 12, ...

(C) 5, 10, 15, 20, ...

▶ See if you can make these patterns with your calculator .

▶ What does this sign mean?

Use your calculator for these.

17 means 'ten' and 7 'units'.

▶ Try it:- 10+7=

Do 10+10=

'ten' and 'ten' make 'twenty', written as 20 (2 tens and no units)

▶ Do 10+10+10=

3 'tens' make 'thirty', written as 30 (3 tens and no units)

▶ Start with 9 units, add 1.

9+1=

▶ Start with 19 - a 'ten' and 9 units.

Add one. 19+1=

20= 2 tens (and no units)

▶ Do these without the calculator.

CHECK each one, as you do it, using the calculator.

3+5=	7+2=	6+3=
30+50=	70+20=	600+300=
4+3=	6+7=	4+5=
40+30=	60+70=	400+500=
7+8=	90+20=	6+8=
70+80=	30+60=	600+800=
8+3=	80+50=	11+2=
80+30=	70+80=	1100+200=
6+4=	90+90=	700+800=
60+40=		500+300=
		700+300=

SOWTE

Add B1

▶ Place the calculator flat on the desk.
SWITCH ON.

▶ Press [1] [+]

▶ Do this again: Press [1] [+]
The calculator should show 2.

▶ Keep on like this, counting as you go until you get to 20. Then stop.

● Count each time you press the [+] key, like this:-

....[1] [+] "three" [1] [+] "four" [1] [+] "five"....

These are the keys you press — what you say

Pat3

What are the next three numbers in each of these patterns?

▶ WRITE DOWN your answers.

(A) 1, 4, 7, 10, 13, ...

(B) 4, 8, 12, 16, 20, ...

(C) 5, 9, 13, 17, 21, ...

▶ See if you can make these patterns with your calculator.

15FA3

▶ Do these without the calculator.
CHECK each one, as you do it. with the calculator.

5-3=	8-3=	6-3=
50-30=	80-30=	600-300=
4-3=	70-20=	10-7=
40-30=	60-30=	1000-700=
8-2=	80-40=	11-2=
80-20=	800-400=	1100-200=
6-4=	7-4=	900-500=
60-40=	700-400=	1200-300=
9-5=	9-2=	700-500=
90-50=	900-200=	8000-3000=
10-4=		
100-40=		

SOWYF

PVE3

▶ Work out (using your calculator).

10+10+13+10=	50+10=
10×4=	60+10=
20+10=	70+10=
20+10+10=	80+10=
30+10=	10×9=
40+10=	90+10=
10×5=	10×10=

▶ Count how many 'tens' there are here
10+10+10+10+10+10+10+10+10+10

▶ Then add them all up, counting as you go:-
"1 ten is ten. 2 tens are twenty.
3 tens are .....
9 tens are 90, 10 tens are 100."

▶ Place the calculator F D

SWITCH ON

▶ Press these keys [3] [+] [4] [=]

The answer should be 7.

▶ Now try these. Do them in your head.

THEN - CHECK with the calculator

5+2=

1+1+1=

1+2+3=

SWITCH OFF

GO TO THE NEXT PAGE

Pat

What are the next two numbers in these patterns?

▶ (WRITE THEM DOWN)

(A) 2, 5, 8, 11, 14 — Hint: 2+3=5

(B) 1, 3, 6, 10 — Notice: 1 (+2) 3 (+3) 6 (+4) 10....

(C) 1, 4, 9, 16, 25 — Notice: 1 (+3) 4 (+5) 9 (+7) 16....

Practice. First without the calculator, then CHECK.

▶ Work out these:-

30+40= (3 tens and 4 tens) 27+1=

50+20= 35+2=

60+30= 33+6=

20+60= 45+3= (four tens and 5 and 3) 39-9=

40+30= 9+1= 59-9=

20+50= 19+1= 83-80=

21+5= (2 tens and one and five) 29+1= 63-60=

23+2= 10+7= 23-20=

20+7=

30+7=

29-9=

▶ Do these without the calculator.

CHECK each one, as you do it, with the calculator.

(If you can't do them without, do the whole exercise with the calculator. Then try again.)

10+10+10+10+10=

10+10+10+10+10+10+10+10+10+10=

(there are ten 10's here - count them)

10x10= 6x10= 60÷10=

10x100= 63x10= 70÷10=

100x100= 72x10= 230÷10=

100x10= 33x10= 570÷10=

1000x10= 8x10= 100÷10=

10000x10= 8x100= 1000÷10=

ten thousand ten thousand 10000÷10=

● Challenge questions (very hard!)

1000x1000 10000000÷10

Ask your teacher to come and see.

Add C2

Place the calculator F D

Switch on

▶ Work out 11+3=

(Press [1] [1] [+] [3] [=])

▶ Now work out these:-

12+4=

19+2=

10+7=

10+10+10=

▶ Switch off when you've finished.

Pat5

● The numbers 1, 4, 9, 16, 25, ...
are called square numbers, because they will make square patterns, like this:-

1 4 9 16

▶ Draw the pattern for 25 - the next one.

▶ Draw the next pattern after 25. (What number is it?)

▶ Work out these:-

1x1, 2x2, 3x3, 4x4, 5x5, 6x6.

▶ Do you notice anything?

15FA5

▶ Do these without your calculator
but CHECK each one as you do it.

30x5	80x3	6x4
30x50	8x30	60x4
70x3	80x30	600x4
70x30	7x4	9x3
500x5	70x40	90x3
500x50	700x400	90x300
60x3	3x60	9x7
60x30	30x60	9x70
	3x600	9x700
		9x7000

pVE5

More practice. (First without the calculator - then CHECK)

▶ Work out these:-

100+100=	305+2=	219+1=	
200+300=	303+6=	239+1=	
500+200=	54+3=	(4 hundred and 5 and 3)	207-200=
200+600=	99+1=		237-230=
400+300=	199+1=		257-7=
201+5= (2 hundred and one and 5)	299+1=		
203+2=	209+1=		
207+1=			

Add Et1

▶ Work out each sum without the calculator.

Then CHECK it straightaway with the calculator.

3+5+2	11+5	8+5
1+7+9	23+2	7+4
5+4+3	48+2	10+9
2+4+6	12+7	9+10
2+6+4	15+3	9+20
1+9+3	20+8	32+4

When you have finished, SWITCH OFF, and tell your teacher.

Pat6

● The numbers 1, 3, 6, 10, 15, 21, ...
are called triangular numbers, because they will make triangle patterns:-

▶ Draw the pattern for 15, the next one.
(First draw the pattern for 10, and then put 5 extra dots underneath.)

▶ Draw the pattern for 21. (Use the pattern for 15 to help you)

▶ Work out these:- (Do you notice anything?)

1x2, 2x3, 3x4, 4x5, 5x6, 6x7.

PVF1

● 100 means one 'hundred' (and no 'tens' and no 'units').

137 means one 'hundred' and 3 'tens' and 7 'units'.
(one hundred and thirty seven)

If we add 'ten' to this, we will have
one hundred and 4 tens and 7 units.

▶ 137+10= (CHECK with the calculator)

▶ Now try these. (THINK first, CHECK afterwards)

381+10=	482+10=
243+20=	635+10=
953+20=	454+30=
168+10=	233+40=

▶ Do each one without your calculator.
WRITE DOWN your answer and CHECK as you go along.

6↑2	28↑7	40↑8
60↑2	280↑7	400↑8
600↑2	2800↑70	4000↑8
60↑20	2800↑70	4000↑80
600↑20	2800↑400	4000↑800
12↑3	42↑6	60↑5
120↑3	420↑6	600↑5
1200↑3	420↑60	36↑6
120↑30	4200↑600	3600↑60
1200↑30	42000↑6000	480↑6
1200↑300	420000↑6	480↑60

1SFA6

Add D1

Counting in even numbers

▶ Place C F D

Switch on

▶ Press 2 ⊕ 2 ⊕ 2 ⊕ ..... and so on.

Count as you go - "two, four, six, eight..." as you see the numbers.

● This is the two times table. (Stop when you get tired!)

The numbers 2, 4, 6, 8, and so on... are called EVEN numbers.

▶ SWITCH OFF W. Y. F.

Pat 7

Work these out. (Use the calculator)

▶ WRITE DOWN the answers.

10x20
20x30
30x40
40x50
.....

This means "continue the pattern".

▶ Now do these:-

15x15
25x25
35x35
45x45
.....

▶ What do you notice?

1SFA E7

▶ Do these without the calculator.

WRITE DOWN your answers and CHECK each one as you do it.

420÷70=	300÷5=
70x4=	60÷30=
500-300=	60x30=
20+60=	180÷20=
90x30=	4x70=
900-200=	40+70=

PVF2

● 820 means 8 hundreds, 2 tens, 0 units.

If we add on 16 (one ten and 6 units)

we get 8 hundreds, 3 tens and 6 units)

820+16= (Try it)

▶ Now try these. (THINK first, WRITE DOWN your answer and CHECK afterwards)

371+14=	482+15=
243+21=	635+43=
537+12=	454+21=
163+13=	233+22=
	250+17=

▶ Place C. F. D.

Switch on.

▶ Press [1] ⊕ [2] ⊕ [2] ⊕ [2] ....

Count as you go, "one, three, five, ...".

You should get all the odd numbers, 1, 3, 5, 7....

(Stop when you get tired!)

▶ SWITCH OFF W. Y. F.

What are the next two numbers in these patterns?

▶ WRITE DOWN your answers.

(A) 3, 7, 11, 15, ...

(B) 8, 11, 14, 17, ...

(C) 99, [illegible], [illegible], 93, ...

(D) 39, 36, 33, ...

▶ See if you can make these patterns with your calculator.

● 2×10=20. The three units have become 2 tens.

3×100=300. The 3 units have become 3 hundreds.

▶ Try these. Use the calculator to CHECK.

5×10=

7×10=

7×100=

12×100=

15×10=

15×100=

16×10=

16×100=

● 20÷10=2. The 2 tens become 2 units.

▶ Try these:-

80÷10=

50÷10=

120÷10=

170÷10=

150÷10=

100÷10=

770÷10=

420÷10=

530÷10=

▶ Do these without the calculator.

WRITE DOWN your answers and CHECK each one as you do it.

900×70=	50×40=
210÷7=	600+700=
700-300=	320÷80=
250-220=	100+30=
7×300=	70-30=
100+500=	60×80=
160÷4=	250÷50=

Add Et2

▶ Work out each sum without using the calculator.

WRITE DOWN the answer.

Then CHECK it, with the calculator.

(i) 41+14	(vii) 93+39
(ii) 23+32	(viii) 49+94
(iii) 27+72	(ix) 1+2+3+4+5
(iv) 34+43	(x) 2+3+4+5+6
(v) 17+71	

Switch off when you have finished.

▶ Then tell your teacher you have finished.

Pat9

▶ Work these out without the calculator (but use it to CHECK).

WRITE DOWN your answers.

▶ Compare the answers in each pair.

This means look at one answer then at the other, and say what you notice

(5x1) (3x3) ← This is the first pair.

(6x2) (4x4)

(7x3) (5x5)

(8x4) (6x6)

(9x5) (7x7)

▶ What do you notice? (Does it work for the next pair?)

pVG2

Practice.

● Notice what happens:-

1 ⇄ 10 ⇄ 30 ⇄ 300 ⇄ 3000 (×10 / ÷10)

▶ Try this on the calculator.

5 × 1 0 = = = ...

and then

5 ÷ 1 0 = = = ...

▶ Now try these (THINK first, then CHECK).

41×10=	67×10=	441×10=	3000÷10=
270÷10=	730÷10=	400×10=	3000÷100=
520÷10=	77×10=	4000×10=	3000÷1000=

15FA19

▶ Do these without the calculator.

WRITE DOWN your answers and CHECK each one as you do it.

1000000÷5=	200×200
1000+3000=	900÷30=
100×100=	70+40+20=
60+80=	160÷8=
900-700=	1100-100=
10×10×100=	300×300=
800-300=	240÷30=
20+50=	
8000+5000=	

▶ Try these. Can you see a pattern?
(Use the calculator to CHECK).

1+2	2x3
1+2+3	3x4
1+2+3+4	4x5
1+2+3+4+5	5x6

▶ Write down the next <u>two</u> pairs.

1+2+3+4+5+6.	....
.....	....

▶ Can you see a rule connecting this number with this number?

Div

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LK

29

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Mult

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Sub

30

Sub A1

▶ PCFDSO

▶ Press these keys 1 0 ⊙ 1 ⊙ 1 ⊙ 1 .....

Count as you go "ten", "nine", "eight", "seven"... "two", "one", "zero".

This sounds like a space craft being launched.

▶ SWITCH OFF when you have finished.

LKA1

● A Puzzle

Suppose you are allowed to press ONLY the keys 1 ⊕ and ⊙

You can press the keys as often as you like and in any order.

▶ How would you get 5 ?
▶ How would you get 12 ?
▶ How would you get 15 ?
▶ How would you get 100 ?

Try to do each one the easiest way.

Mult 1

▶ PCFD

▶ Work this out without the calculator.

2+2+2+2+2=

▶ Now CHECK with the calculator

▶ Now use the calculator for 2x5=

▶ Work out 6+6+6+6= WRITE IT DOWN

CHECK with the calculator.

How many 6's are there?

Use the calculator for 6x4=

▶ Do these with the calculator. WRITE DOWN THE ANSWERS

7+7+7+7= 3+3+3+3+3+3= 9+9+9=

▶ Can you see how to do these by multiplying? Do it.

▶ SWOWYF

31

Div 1

● Whole numbers, like 31, always have the decimal point at the end

If the decimal point comes in the middle like this 1.25 it is a whole number.

▶ Try 1 ÷ 2. (Press 1 ⊕ 2) You should get 1.5 (one and a half)

This is a whole number - it means 1½

(we will explain this later on).

▶ Work these out without using the calculator.

CHECK each one as you do it.

(The answers are all whole numbers)

2817. 12¼4.

6¼9. 16¢6

SOW ?F

32

PCFDSO

Do all of these, WRITE DOWN your answers, then CHECK with the calculator.

(To check the first one you would press 8 - 3 =)

8-3=	12-5=	14-7=
9-5=	13-2=	15-9=
7-2=	9-3=	17-2=
11-7=	6-1=	12-9=

(Press 1 1 - 7 =)

SWITCH OFF when you have finished.

PCFD

▶ Work these out without the calculator. WRITE DOWN your answers.
Then CHECK with the calculator. 5x7=
6x6=

▶ Now try 4x6= in the same way. WRITE DOWN your answers.
5x5=

Do you notice anything?

▶ Try these:- WRITE DOWN your answers.

7x9=	6x8=	2x4=
8x8=	7x7=	3x3=

▶ Make up two more examples like this, and try them.

8x..=	9x..=
9x..=	10x..=

▶ Write down what you have noticed.

SWITCH OFF. Ask your teacher to come and look.

PCFD

● If we work out $8\frac{1}{2}3$ on the calculator, we get 2.666666. ▶ Try it.

This looks like a big number - but it isn't. Can you see why?

● This is why:- 6 is two 3's
9 is three 3's

So 8 must be "two 3's and a bit over".

2.666666 is more than 2 and less than 3.

It isn't a whole number - because it has a decimal point in the middle.

▶ Will $5\frac{1}{4}$ be a whole number? Try it.

▶ Will $9\frac{1}{7}$ be a whole number? Try it.

SOW YF

● Suppose you are allowed to press only the keys 2, ⊕, and ⊙, as often as you like and in any order.

▶ How would you get each of these numbers?

8, 22, 26

▶ Can you get the number 5?

LKA2

Sub B1

▶ Try these on the calculator. WRITE DOWN your answers.

[1] [1] ⊕ [3] ⊖ [3] ⊙

21+7-7=	9+6-6=
14+9-9=	1002+5-5=
1+4-4=	12345+6-6=
	124-7+7=

● You are allowed to press the keys [1], [2], ⊕ and ⊙ ONLY,
in any order and as many times as you wish.

▶ Can you get these numbers?

5, 13, 23, 9, 20.

LKA3

Mult3

▶ Use the calculator for these.
WRITE DOWN the answers.

4x3=	9x2=	17x13=
3x4=	2x9=	15x17=
7x9=	3x8=	25x33=
9x7=	8x3=	33x25=
34x11=		
11x31=		

35

▶ If 121x33=3993, what is 33x121?
Write it down, then CHECK.

▶ If 37x41=1517, what is 41x37?
Write it down, then CHECK.

▶ 2714x13=35282. Find 13x2714. CHECK.

246	273	648	6046	183
3382	4069	5469	2847	2544
7248	4987	9248	7249	3485

Remember - if you get an answer with lots of figures, and a decimal point in the middle, like this

123.45678

don't worry! It just means
it isn't a whole number.

▶ Some of these will give whole number answers.
Try each one. Say which will, before you CHECK with the calculator.

▶ Will 1344 be a whole number? Try it.

▶ Will 1417 be a whole number? Try it.

Div3

▶ ANSWER

36

Div t1

37

▶ Do each of these without the calculator.
(Then CHECK it with the calculator)

24÷6	25÷5	64÷8
63÷7	35÷5	54÷9
36÷6	36÷4	72÷9
30÷6	32÷8	18÷3
40÷10	56÷7	48÷6
56÷8	48÷8	36÷9
40÷5	24÷4	32÷4
40÷8	63÷9	35÷7
28÷7	45÷5	70÷10
30÷5	28÷4	45÷5
49÷7	54÷6	42÷7
60÷10	50÷10	

Now ask you teacher to test you on these

LKB1

● You are allowed to press the keys
[2], [3], ⊗ and ⊙, ONLY - in any order and as many times as you wish.

▶ See if you can get these numbers.
(Write down how you did each one)

6, 9, 8, 12.

▶ Can you work these out in your head?
WRITE DOWN your answers.

11+4-3	1127+5-4
20+4-3	1729+9-8
29+4-3	134+205-204
187+4-3	

▶ Now CHECK them (with the calculator).

▶ Use the calculator for these.
WRITE DOWN the answers:-

2x3x4=	5x3x7=	99x9x999=
2x4x3=	7x5x3=	9x99x999=
3x4x2=	3x5x7=	999x9x99=

▶ 8x5x6=240
What is 5x6x8?
What is 6x8x5?
} CHECK

▶ Make up some more like this.
Write them down, then CHECK.

▶ Switch off, and ask your teacher to come and look.

Sub Dt1

▶ Try these without your calculator.

But CHECK each one as you do it.

9-3	7-4	7-5
8-1	6-2	6-5
12-4	10-7	5-5
7-2	6-4	8-4
6-3	7-3	10-6
8-7	8-3	7-6
10-1	10-2	8-6
7-1	6-1	10-5
10-4	10-3	5-3
6-2	8-5	

▶ When you have finished, ask your teacher to come and test you.

Mult5

▶ Try this with the calculator.

WRITE DOWN your answer.

2x2=
2x2x2= (3 lots of 2)
2x2x2x2= (4 lots of 2)
2x2x2x2x2= (5 lots of 2)
2x2x2x2x2x2= (6 lots of 2)

● This is "6 lots of 2, multiplied together"

It isn't the same as 2+2+2+2+2+2 (Is it?) CHECK.

This is "6 lots of 2, added together".

▶ How many lots of 2 multiplied together do you need to get over 1000 (a thousand)?

Try it.

▶ How many lots do you need to get over 1,000,000 (a million)?

▶ SWOYYF

● Rule for even numbers

A number which divides exactly by 2 is called an even number.

▶ Which of these numbers are even?

5 8 21 12 19 23 40 16 24

CHECK with the calculator.

▶ Use the calculator to decide which of these numbers are even

18 28 36 48 378

13 23 33 43 373

▶ Write down all the even numbers less than 12.

▶ Can you see a quick way of deciding whether a number is even?

Write it down on your sheet, like this

A number will be even if it ends in.....

Switch off and tell your teacher you have finished.

LKC1

● You are allowed to press 1, 2, +, −, and =

in any order and as many times as you wish.

▶ Can you get 17?

▶ Can you get 23?

▶ Can you get 33?

Div 5

41

Division by 5

- Some numbers will divide **exactly** by 5.
  Others won't. 35 will, 37 won't. (CHECK)

▶ Sort out these numbers. Draw two boxes on your sheet, like this

Box A	Box B

Write those that will divide exactly by 5, in Box A
and those that won't in Box B.
CHECK each one with your calculator.
Here are the numbers to try:-

77, 45, 32, 81
95, 70, 30, 91
83, 55, 25, 205
160, 35, 21, 60

▶ Do you notice anything?

▶ Write down a rule, like this:-

"A number will divide by 5 if it ends in ☐ or ☐"

▶ Switch off and tell your teacher.

LKC2

- You are allowed to press [1], [2], [+], [=] and [C] in any order and as many times as you wish, BUT this time don't use numbers like 22, 11 and so on (where you press 2 number keys one after the other).

▶ Try to get these numbers

(a) 9
(b) 17
(c) 10
(d) 36

3

42

SOWTF

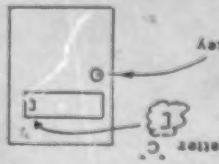
- If you work out

  2x2x2x2x2x2 ... x2x2x2 ...

  where the number of '2's' is very large, the calculator will "overflow". ▶ Try it.

- This means the answer is too big for the calculator to show. You can tell this has happened, because a letter "E" appears at the right hand end of the display and the buttons won't work.

▶ To return to normal, press the "CLEAR" key



Mu116

PVA

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PVC

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PVD

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PVM

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PVA1

- If we start with 5 hundreds, 3 tens and 7 units
  (written as 537)
  and we add on 6 units, what will we get?
- ▶ Do this 7+6=
  7 units + 6 units = 13 units = 1 ten and 3 units.
  So 537+6 = (THINK, then CHECK)
  (5 hundreds, 4 tens, 3 units).
- ▶ Try these: THINK first, WRITE DOWN your answer, then CHECK.

4+7=	9+3=	8+5=
284+7=	249+3=	188+5=

PVB1

Work these out without the calculator, then CHECK.

80+2	90+3	150+5
180+3	120+4	500+4
200+4	180+5	60+2
140+7	150+3	140+2
180+6	450+5	120+3
80+1	410+2	360+4

PVC1

You are given two numbers.

How to decide which is the larger one.

We know that 8 is bigger than 5.

- ▶ Work out 8-5 (Press the keys 8, −, 5, =).
- ▶ Now work out 5-8 (Press the keys 5, −, 8, =).

Are the answers the same?

(In the second one you should get a little "take-away"sign like this -3. So what you see is 3. This shows you tried to take the bigger number away from the smaller one).

- ▶ Try the same thing with the numbers 9 and 2.
  (Which is the larger one?)

PVD1

Work these out without the calculator.
Then CHECK.

80×3	81×3	87×3
40×4	71×6	49×4
70×6	81×5	15×7
20×9	32×4	33×9
80×7	42×4	24×6
30×5	21×9	12×8
40×8	61×7	47×5

PVA2

▶ Work out 3+8=

▶ Now start with 5 hundreds, 3 tens and 7 units, and add 80 (that is, 8 tens) (537+80)

What do we have now?

Answer. There will be 5 hundreds, eleven tens and 7 units

But, ten tens make another hundred.

so we have 5 hundreds + 1 hundred + 1 ten + 7 units

▶ Try it on the calculator: 537+80=617

▶ Try these (THINK, then CHECK).

285+10=	389+80=
285+30=	447+70=

PVC2

Which number is bigger, 37 or 45?

You can check by taking the smaller number away from the bigger one.

▶ Do this.

If you don't get a :-} sign, you were right!

If you take the bigger number away from the smaller one, by 37-45, you will get the sign :-{ . This shows you did it wrong way round.

▶ Try it and see!

▶ Which is the bigger number, 91 or 78?

▶ Find the biggest number in these (29, 41, 62)

PVM2

Work these out without the calculator

Then CHECK.

210×5	214×7	225×5
720×3	133×5	1432×3
410×7	342×3	1762×4
230×5	216×6	1894×6
310×8	347×2	3621×9
620×3	184×8	4851×7
440×6	125×3	6244×8
370×2	135×4	1428×2

PVD2

Work these out without the calculator.

Then CHECK.

126÷3	2792÷8	1548÷9
3171÷7	1059÷3	228÷2
2328÷4	756÷2	1596÷7
1269÷3	7245÷9	1032÷6
5824÷8	1674÷3	3095÷5
698÷2	1552÷4	616÷4

PVA3

● **Practice and harder examples**

THINK first. WRITE DOWN your answer, then CHECK.

▶ **Try these:**

5+6=	233+42=
375+6=	How many units altogether?
1+9=	How many tens?
231+9=	233+82=
6+4=	233+17=
567+40=	233+18=
2+9=	147+34=
228+90=	147+94=

▶ **Find the biggest number here:**

371 38 205 1241

▶ **CHECK**

Which is bigger, 999 or 1001?

CHECK

▶ **Find the smallest number here**

327 411 298

CHECK

PVC3

PVD3

Work these out without the calculator.

Then CHECK.

3)57	8)344	4)244	7)392
5)85	6)246	3)252	9)477
2)134	5)365	7)644	4)260
3)177	9)522	5)115	6)402

PVE3

Estimation. **For each calculation choose the answer which is nearest to the correct answer.**

Afterwards check with the calculator.

		Estimates			
1) 84×3	a) 100	b) 200	c) 400	d) 800	
2) 217×5	a) 100	b) 500	c) 1000	d) 2000	
3) 347×8	a) 2500	b) 4000	c) 10000	d) 25000	
4) 1762×3	a) 600	b) 6000	c) 40000	d) 60000	
5) 410×7	a) 28	b) 280	c) 2800	d) 28000	
6) 225×7	a) 100	b) 1500	c) 5000	d) 7000	

PVA4

Test

▶ Do these without the calculator.

WRITE DOWN your answers.

Then go back and CHECK each one.

374+7	123+90	352+33
237+20	146+27	464+27
361+50	193+5	182+35
217+5	232+19	174+48
219+40	255+70	126+94
279+60	118+23	

▶ Now ask your teacher to come and test you.

PVC4

● We use the sign $>$, like a hairpin, to mean "is bigger than".

So we write $8 > 5$

which means "8 is ..... than 5"

(bigger)

You can use the sign the other way round $5 < 8$

"5 is less than 8".

Notice that the 'big' end of the hairpin goes next to the big number.

▶ Which one of these is WRONG?

$3 < 7$, $5 > 4$, $2 > 9$

▶ Copy out these pairs of numbers.

Then put the sign right way round between them

3 6 100 3 15 24 29 10

PVD4

20 facts.

LEARN these by heart. When you are ready ask your teacher to test you.

$\frac{60}{3} = 20$	$\frac{90}{5} = 18$	$\frac{48}{3} = 16$	$\frac{24}{3} = 8$
$\frac{60}{2} = 30$	$\frac{100}{5} = 20$	$\frac{72}{3} = 18$	$\frac{150}{3} = 50$
$\frac{60}{5} = 12$	$\frac{100}{4} = 25$	$\frac{96}{3} = 24$	$\frac{80}{2} = 40$
$\frac{70}{5} = 14$	$\frac{80}{4} = 20$	$\frac{75}{3} = 25$	$\frac{90}{6} = 15$
$\frac{80}{5} = 16$	$\frac{60}{4} = 15$	$\frac{48}{3} = 16$	$\frac{90}{2} = 45$

Tab

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Est

Tab

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SDA

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PVS

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The 7-times table:-

▶ Use the calculator to work out the 7-times table.

To do this, press these keys:- [7] [×] [1] [=] ⟶ Answer 7

then [7] [×] [2] [=] ⟶ Answer 14

.....

and so on up to

[7] [×] [1] [0] [=] ⟶ Answer 70.

Numbers which are nearly equal.

● 78 is nearly the same size as 79.

So, when you take 78 away from 79, the answer is smaller than either of these numbers.

▶ Do it:- 79-78

(Press the keys [7] [9] [−] [7] [8])

The answer should be {1}

(If you take the big one away from the small one, you will get a "take away" sign in the display like this {1.})

● Here is a number {53}

▶ Decide which of these numbers is nearly the same size as 53

531 54 530

CHECK by taking 53 away from the one you choose.

Even/Odd

● 10 is an even number because it is twice 5. 5x2=10.

12 is twice another number. Which one? CHECK.

▶ Show that 18 is even by doubling another number to get 18. CHECK.

▶ Some of these are even, others are not.

Find out which ones are even, and say which number you must double to get them.

WRITE DOWN your answers.

{ 20, 11, 19, 14, 16, 9, 13
  12, 7, 23, 27, 26, 24.

▶ Do each one of these without your calculator - then CHECK it, straightaway.

47·5	89·8	27·4	34·1
96·3	94·2	62·1	82·1
33·2	37·6	49·2	63·2
39·5	28·2	33·1	43·3
18·2	57·7	28·3	99·7
58·5	23·1	26·2	36·5
66·4	69·4		

Tab A2

▶ Use the calculator to work out the 8-times table,
by pressing these keys:-

[8] [×] [1] [=] ⟶ Answer 8

then [8] [×] [2] [=] ⟶ Answer 16

.....

and so on up to

[8] [×] [1] [0] [=] ⟶ Answer 80.

▶ Do the same for the 4-times table.
(WRITE DOWN the 4 times table as you work it out)

▶ Which of the numbers in the 4-times table are also in the 8-times table?

▶ SOWYF

Est A2

▶ Say which number is nearly the same else as 612. Target number

60, 600, 6000 ⟵ Numbers to try.

(WRITE DOWN your answer. Do the same for these other questions)

▶ Say which number is nearly equal to 253

250 500 25

▶ Say which number is nearly equal to 78

7 8 80

▶ Say which number is nearly equal to 1742

114 1800 742

SDA2

● Even numbers divide exactly by 2.
Whole numbers which don't divide exactly by two are odd.

▶ Which of these are odd? 4, 7, 8, 3, 5.
WRITE them DOWN. "These numbers are odd....."

● Odd numbers are always one more than an even number.

Example: 14 is 7×2. So 14 is even.
15 is one more than 14; 15 is odd.

If you divide 15 by 2 you don't get a whole number.
(It goes 7½ times - but the calculator will say 7.5.)

▶ Try [9] [÷] [2]. You don't get a whole number - so 9 is odd.

▶ Try 13÷2. Is 13 odd?

58

PVS2

▶ Do each of these without your calculator.
Then CHECK it, straightaway.

47-20	62-10	49-20
89-30	75-60	28-10
17-10	41-20	71-50
42-20	13-10	49-10
35-10	94-60	62-20
67-40	65-30	53-30
83-50	87-60	25-10

51

The 4-times table:-

▶ Press these keys in turn:-

Say the table as you press (+), like this. "One 4 is 4,
Two 4's are 8,
.....
Keep going until you come to
"Ten 4's are 40."

▶ SOWYF

● Is 17 an odd number?
It will be if the number before is even.

▶ Write down why this is so, like this

17 will be odd if ☐ is even
And ☐ is even because it is ☐ x 2.

▶ Now CHECK, by 1 7 - 2 =
Does it give a whole number?

▶ Which of these numbers are odd?

30	13	18	7	14	
25	11	4	19	23	26

You know that 6x3=18

▶ Can you say what 60x3 is? CHECK with the calculator.

▶ Can you say what 60x30 is? CHECK.

▶ Write down answers to each of these 'sums'.

50x3	50x30	40x4
40x30	40x3	40x60
50x2	50x20	40x50

▶ CHECK each one!

▶ SOWYF

▶ Do each of these without your calculator.
Then CHECK it, straightaway.

47-22	62-32	45-24
89-33	75-41	28-16
17-14	41-21	73-52
42-31	13-12	49-17
35-20	91-43	62-21
67-41	65-33	53-31
83-51	87-42	25-13

Tab B2

The 3-times table:-

▶ Press these keys in turn:-

Say the table as you press ⊕,

like this. "One 3 is 3,

Two 3's are 6,

.....

Keep going until you come to

Ten 3's are 30."

▶ Do the same thing to get the 6-times table - this time use [6] and ⊕.

WRITE DOWN the 6-times table.

▶ Which of the numbers in the 3-times table are also in the 6-times table?

SDA4

▶ Write down the answers. Don't use the calculator.

Afterwards CHECK your working with the calculator.

3+4	2+3+4	6+4
4+3	3+4+2	4+6
8+7	4+3+2	7+2
7+8	5+3+7	2+7
9+2	7+3+5	1+2+3+4
2+9	3+5+7	4+3+2+1
3+8	8+9+2	3+1+4+2
8+3	2+9+8	4+1+3+2
	9+2+6	

▶ SOWYF

62

29

Esk C1

Suppose you had to work out 51x11

▶ Decide which of these 'sums' would give the nearest answer.

60x12 50x10 15x10

▶ CHECK by working out these three 'sums' and comparing with the target 51x11

▶ Which of these three will give nearly the same size answer as 31+304 ?

530+3 50+30 500+300

▶ CHECK all three.

● To find 8-5 we might say

9+1=6. 9+2=7. 5+3=8.

That is, we count on from {5} to reach {8}. 19

● So we can find 67-42 like this:-

42+{8}=50 8+10+7=25

50+{10}=60

60+{7}=67 so 67-42=25.

▶ (CHECK with your calculator that 67-42=25)

▶ Find 70-18 by "counting on" 18 ---how many?--> 20 ---how many?--> 70.

▶ Find 64-33 by "counting on" 33 →? 40 →? 60 →? 64

▶ Find 104-67 by "counting on" 67 →? 70 →? 100 →? 104

▶ CHECK each one on your calculator.

▶ Tell your teacher when you finish.

PVS4

19

Tab C1

The 3-times table:-

▶ Press these keys in order [3] [×] [5] [=]

The answer should be 15

▶ Now press these keys [7] [=]

The answer should be 21

▶ Guess what the answer will be in each of these:-

[8] [4] [6] [2] [9] [10] [3] [=] [=] [=] [=] [=] [=] [=]

CHECK each one to make sure.

▶ SOWYF

Esk D1

SDA5

▶ Work these out without the calculator.

Write down the answers.

Then CHECK each one with the calculator.

1+2+3
2x3

2+3+4
3x3

5+6+7
6x3

7+8+9
8x3

1+2+3+4+5
3x5

4+5+6+7+8
6x5

6+7+8+9+10
8x5

▶ Do you see a pattern?

▶ Try to make up one of your own with the same pattern:

You could try 3+4+5

Write it down.

▶ Switch off, and ask your teacher to look at what you have done.

63

PVS5

SOWYF

▶ Do each of these without your calculator.

CHECK each one as you do it.

33-7	45-8	61-5
89-9	23-9	74-7
47-9	72-7	42-9
62-5	64-6	27-8
75-8	87-8	93-5
41-2	83-5	65-9
13-5	53-4	84-7
94-7	25-7	76-9

64

Suppose you are asked to work out

29×38

▶ Choose the 'best' answer - that is, the one you think is nearest to the correct answer:-

(600 1200 1500)

▶ Now CHECK.

▶ If you are asked to work out 42x39, which of these will be nearest?

120 1200 1600

▶ CHECK.

The 5-times table:-

▶ Press these keys in order [5] [×] [4] [=]

The answer should be 20

▶ Now press these keys [7] [=]

The answer should be 35

▶ Guess what the answer will be in each of these:-

[1] [2] [6] [3] [8] [5] [9] [0]

[=] [=] [=] [=] [=] [=] [=]

CHECK each one to make sure.

▶ SOWYF

SDA6

▶ PCFD

▶ Work these out without the calculator.

Write down your answers.

CHECK each one with the calculator.

4+5	5+6
3+4+5+6	4+5+6+7
8+9	7+8
7+8+9+10	6+7+8+9

▶ Do you see a pattern?

▶ Try to make up one of your own.

You could start with 2+3

▶ Do another if you can. CHECK

Write down your pattern

▶ Switch off and ask your teacher to look.

● An estimate is a number close to the right answer.

Suppose you have to work out 19×36=

▶ Which of these will give nearly the right answer?

20×40= 10×40= 10×30= 20×30=

▶ CHECK. (You need to work them all out)

Suppose the problem is 38×143=

▶ Which of these gives a good estimate?

40×100 30×140 40×15 40×140

CHECK

▶ Now test these as estimates for 174×249

100×200 200×200 170×24 200×250

CHECK.

▶ Do these without your calculator. CHECK.

(WRITE DOWN each answer)

33-17	45-28	61-35
89-29	23-19	74-47
47-39	72-27	42-59
62-15	64-16	27-18
75-28	87-28	93-25
41-32	83-15	65-19
39-15	53-24	84-67
94-27	25-17	76-39

PVS7

▶ Do these on your calculator

- but only AFTER you have tried them without.

(Do them in your head if you can, and CHECK each one straightaway)

374-7	245-8	161-5
233-7	123-9	374-7
189-9	472-7	442-9
247-9	264-6	627-8
875-8	187-8	293-5
141-2	283-5	565-9
313-5	653-4	184-7
194-7	125-7	876-9

68

SDA7

▶ SOWTF

▶ Try these. Do them without the calculator.

WRITE DOWN your answers.

CHECK each one as you do it.

6×3=	6×4=	12×3=
9-3=	24×4=	15-3=
12×7=	8×9=	5×2=
19-7=	72×9=	7-2=
5×4=	7×7=	3×5=
9-4=	49×7=	15×5=
10×6=	2×9=	9×3=
16-6=	18×9=	27×3=

67

Est E1

▶ Work out this multiplication.

Do it without using the calculator first. (30x20=)

WRITE it down.

▶ Now CHECK using the calculator.

▶ Can you tell whether the answer to (40x20=)

will be more or less than this?

Can you see how to tell without working it out?

CHECK.

Tab Et1

▶ Choose a number - suppose you choose (6)

▶ Now get the 6-times table on the calculator as you did before

Say the table as you speak each number just before it appears.

▶ Try again - a different number -

Practice some more of your tables in this way, especially those you don't know very well.

▶ When you are ready, SWITCH OFF and ask your teacher to test you.

5

Gm9

69

2 players, 1 calculator

(1) A writes down two numbers with nearly the same digits.

Example. 3721
3921 Only ONE digit can be different

(2) B sets the smaller number on the calculator.

(3) Now B tries to change it into the larger number by adding something on.

(In this example he could use +200, since 3721 +200=3921 CHECK it!)

(4) Only TWO 'goes' are permitted. The time limit is 20 seconds.

(5) If B succeeds he gets a point.

(6) Now A and B swop over, so A has the calculator and B thinks of the two numbers.

[Harder version: the two numbers are the same except for TWO digits].

Gm10

2 players, one calculator

(1) You play in turn.

(2) The first player writes down a calculation, like one of those shown below

(3) The second player has to write down an estimate of the answer (roughly how big it is).

(4) Then the first player CHECKS with the calculator, like this:-

- Work out the true answer.
- Divide the true answer by the estimate answer.
- The estimate is good if the result lies between $\frac{1}{2}$ and 2 (more than 0.5... and less than 2.0...)

Example: Problem 43x26. Estimate 800. True answer 1118.
1118÷800 is less than 2, so O.K.

(5) Now swop over and go back to step (2). Score one point for each "good" estimate.

Some examples of calculations to try:-

(a) $\frac{17\times47}{112}$ (b) $\frac{29\times74}{125}$ (c) $\frac{261\times38}{42}$ Now make up your own.

The 6-times table:-

▶ Press these keys in turn:- 6 = 6 = 6 = 6 = 6 =

▶ How many times altogether did you press the 6 key?
You have worked out 6x3 (that is, three also)

▶ Now press the little blue T key to get the answer

▶ Work out 6x5, by pressing 6 = 6 = 6 = 6 = 6 = 6 =
(that is, press 6 and then = five times over. Now press T

▶ SOWTF

SDAT1

Speed Test

▶ Work out these without the calculator.
WRITE DOWN these answers, as quickly as you can.
Then CHECK them with the calculator.

3x7	5x4	7-3
1x7	5+4	36÷4
7-3	24÷4	9x7
18÷3	3+8	9+7
6+2	8-3	9-7
6-2	8x3	9-2
6x2	5x7	9+2
10÷2	5+7	9x2

▶ Switch off and tell your teacher when you've finished.

Tab D2

The 9-times table:-

▶ Press these keys in turn:- 9 × 9 =

How many times have you pressed the 9 key?

You have worked out 9x2 (that is, two nines).

▶ Now press the little blue T key to get the answer.

▶ Work out 9x4, by pressing 9 × 9 × 9 × 9 =

(that is, press 9 and then × four times over).

Now press T

▶ Find in the same way 9x6 and 9x7.

▶ SOWYF

71

D.I.Y.

▶ Make up some 'sums' for yourself

with +, −, ×, or ÷.

Don't make them too hard! Make up 15 sums in all.

▶ Now do them without the calculator.

WRITE DOWN each 'sum' and your answer.

Afterwards CHECK.

▶ Switch off and ask your teacher to test you.

▶ SOWYF

SDAt2

Gm3

No calculator needed - so make sure you have switched off!

- Two children play a game. They are called Alan and Bill.
- Alan thinks of the number 7 and tells it to Bill.
- Bill changes it into a new number using a secret rule. Bill says "10".

▶ Can you guess Bill's rule?

Here are some more facts to help you:-

Alan says	Bill says
5	8
9	12
2	5

▶ Turn over to the sheet Gm4.

Gm1

Unarmed combat. A game for 2 players A and B.

You need a special set of 'cards' and a calculator.

One player, A, can use the calculator, which is switched on.

The other player, B, is "unarmed".

- B turns over a 'card' and works out the answer to the 'sum' on it.

If he gets it right before A says the answer, he wins the point.

If A is first, he wins the point.

- After 5 turns the players change over so that B has the calculator and A turns over the cards.
- First to get 10 points is the winner.

(If there is a 'dead-heat', or if both answers are wrong, play again with a new card.)

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19

Tab Et2

Choose any two numbers

- suppose you have chosen 7 and 3

Press the [7] key, then the [×] key.

Do this 3 times

Say what 7x3 is.

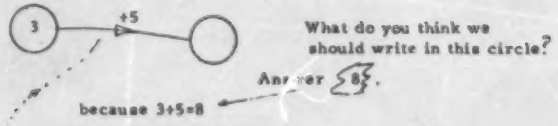
Now press the blue [T] key to CHECK.

Practice some more of these.

When you are ready, SWITCH OFF and ask your teacher to test you.

SDA t3

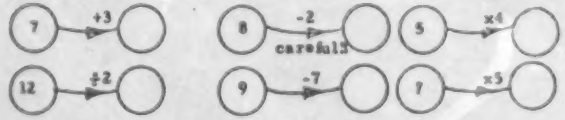
● In these 'sums' we use arrows like this:-



So this arrow means "add 5".

▶ Copy each of these.

Fill in the empty circles. Don't use the calculator except to CHECK.



▶ SOWYF

Gm2

Game for 2 people and one calculator.

"I think of a number, double it and add 3.
The answer is 11. What was my number?"

▶ What do you think it was?

● A thinks of a number, doubles it and adds 3.

He tells B the answer.

● B has to say what A's first number was.

If he gets it right, he scores a point.

● A can use the calculator to work it out

(He covers it with his hand so B can't see)

B cannot use the calculator.

● On the next turn B has the calculator and chooses the first number. A has to say what it was.

● First to get 5 points WINS.

It was four

Gm4

In the last game (Gm3) Bill's rule was "number, add 3".

They could play this with a calculator, like this:-

● When Alan says "7", Bill presses (number) [+] [3] [=]

- the answer is [10], which he shows to Alan.

● Alan suggests several starting numbers and tries to guess Bill's rule. Bill only tells him the finishing number. (Bill covers the keys with his hand so Alan can't see).

When Alan says "5", Bill presses [5] [+] [3] [=]

Bill says the finishing number. [8]

● When Alan guesses the rule, they change over.

Here are some rules you could try:

▶ Take turns with the calculator. Choose a rule but DON'T tell your partner!

Number x 2	Number x 3
Number + 5	Number - 2
(Number x 2)+1	(Number x 10)+7

▶ **Press these keys:-** [5] [×] [4] [=]

You should get {20} **because**

5x4=20.

▶ **Do this multiplication without the calculator**

5x7=

Now use the calculator to CHECK it.

▶ **Do each of these without the calculator. WRITE DOWN the answer.**

Then CHECK with the calculator.

7x3=	3x9=	9x6=
4x8=	8x7=	5x8=

▶ **Make up some more for practice.**

▶ SOWYF

2 players and one calculator

▶ Write down the numbers {1, 2, 3, 4, 5, 6, 7, 8, 9} on a sheet of paper.

▶ Press either ⊕ or ⊖ , and just one of these numbers (then press =)

▶ Cross off the number you chose.

▶ Take alternate turns with your partner.

The aim is to build up to {30}

● Each number can be used only once - cross it off the list when you use it.

● The one who reaches exactly {30} is the winner.

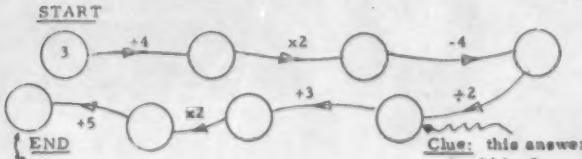
(If you run out of numbers, the one who got nearest to {30} is the winner).

● **This is a mystery tour.**

Directions .

▶ **The "route map" is shown below. First copy it on to your own sheet. Follow the arrows.**

▶ **Fill in each empty circle on your sheet with the correct numbers. Don't write on this sheet!**



▶ **Now make up your own mystery map. (Don't use ÷)**

▶ SOWYF

2 people, 1 calculator

Two numbers are given: there is a list below.

(1) A sets the first number on the calculator.

(2) B uses one of ⊕, ⊖, ⊗, and ÷ , and the second number.

B doesn't let A see which key he presses.

(3) A has to say which key was pressed {⊕ ⊖ ⊗ ÷}

AND

A has to get back to the first number using the second number and one of {⊕ , ⊖ , ⊗ , ÷}

(4) A scores one point for each part. Now swop over and go back to step (1).

Pairs of numbers to use:

{42 6} {24 8} {40 5} {45 9} {56 7} {27 3} {28 4} {24 6} {18 6} {64 8} {20 5} {18 9} {21 7} {15 3}

Gm5

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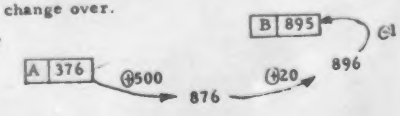
Game for 2 players and one calculator.

- A and B each choose a whole number less than 1000.
  They write down their numbers.
- A sets his number on the calculator,
- Then B has to change it into his number using only numbers and the ⊕ and ⊖ keys, in as few steps as possible.
- Now A re-sets his number and tries to change his number into B's number in even fewer steps.
- If A uses fewer steps he gets a point. Otherwise B gets the point.
- Now they change over.

Example:



Gm7

Game for 2 players and one calculator

(1) Player A sets a "start" number - say [7] - on the calculator
Then he chooses a "target" number - say 45 - and writes it down.

(2) Player B now presses one of the keys ⊗, ⊕, ⊖

and also one of the keys [7] [8] [9] / [4] [5] [6] / [1] [2] [3]

(and then the = key).

His aim is to reach the "target" number.

(3) If he fails, player A now carries on and tries to reach the target number.

(4) First to reach the target scores one point.

(5) Afterwards, for the next time round, A and B change places.

A harder version: Player A cannot use the [7] [8] [9] keys and player B cannot use the [4] [5] [6] keys. Both can use the [1] [2] [3] keys. N.B. They 'swop' at each turn.

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Tab Ef3

- Choose any two numbers - say you choose {5} and {6}
- Multiply them on the calculator:-
  [5] ⊗ [6] =
- Say the answer before it appears.
  (Can you beat the machine??)
- Try some more like this for practice.
- When you are ready, SWITCH OFF and ask your teacher to test you.

4 x 3	6 x 2	4 x 5	5 x 4
6 + 6	8 + 4	10 x 2	2 x 10
3 x 4	11 + 1	11 + 9	17 + 3

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2 x 6	15 – 3	18 + 2	27 – 7

80

3 x 5	5 x 3	2 x 9	9 x 2
13 + 2	10 + 5	6 x 3	3 x 6
9 + 6	17 − 2	16 + 2	8 + 10

81

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7 + 8	18 − 3	20 − 2	11 + 7

4 x 7	7 x 4	6 x 5	3 x 10
24 + 4	20 + 8	15 x 2	5 x 6
14 x 2	30 − 2	24 + 6	33 − 3

2 x 2 x 7	26 + 2	21 + 9	27 + 3

8 x 3	3 x 8	7 x 3	3 x 7
4 x 6	6 x 4	10 + 11	18 + 3
12 x 8	18 + 6	14 + 7	16 + 5

85

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17 + 7	27 − 3	2 + 19	24 − 3

$18-6$	$48\div4$	$80\div4$	$24-6$
$28-16$	$36-16$	$31-16$	$34-16$
$(2\times5)+2$	$(3\times5)+5$	$(3\times4)+3$	$(2\times8)+2$

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$24\div2$	$40\div2$	$30\div2$	$36\div2$

$(5 \times 4) + 10$	$(3 \times 9) + 1$	$7 + 3 + 4 + 7$	$2 \times 3 \times 2 \times 2$
$60 \div 2$	$14 + 7 + 7$	$25 - 1 + 2 - 5$	$(4 \times 7) - 4$
$15 + 10 + 5$	$35 - 7$	$42 \div 2$	$(7 - 3) \times 6$

$(3 \times 11) - 3$	$(40 \div 2) + 8$	$(3 \times 5) + 6$	$(24 \times 3) \div 3$

5x7x4	5 x 2 x 15	5 x 8 x 4	17 x 2 x 5
5x14x2	5x6 x5	5 x4 x 8	5 x 34
700 ÷ 5	(145+155)÷2	(370+270)÷4	(390+290) ÷4

91

92

121+ 7+12	117+ 11+22	64 + 31 + 65	74+55 +41

73+29+38	98+33+19	84+35+41	71+45+54
631−129−362	168−27+9	201−38−3	642−342−130
(246÷2)+17	(363÷3)+29	(524÷4)+29	(627÷3)−39

93

94

152−18+6	172−11−11	194−17−17	145+29−4

PROGRESS CHART

Name .....